

## NOTES ON SOME MONOCOTYLID TREMATODES.

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(Six Text-figures.)

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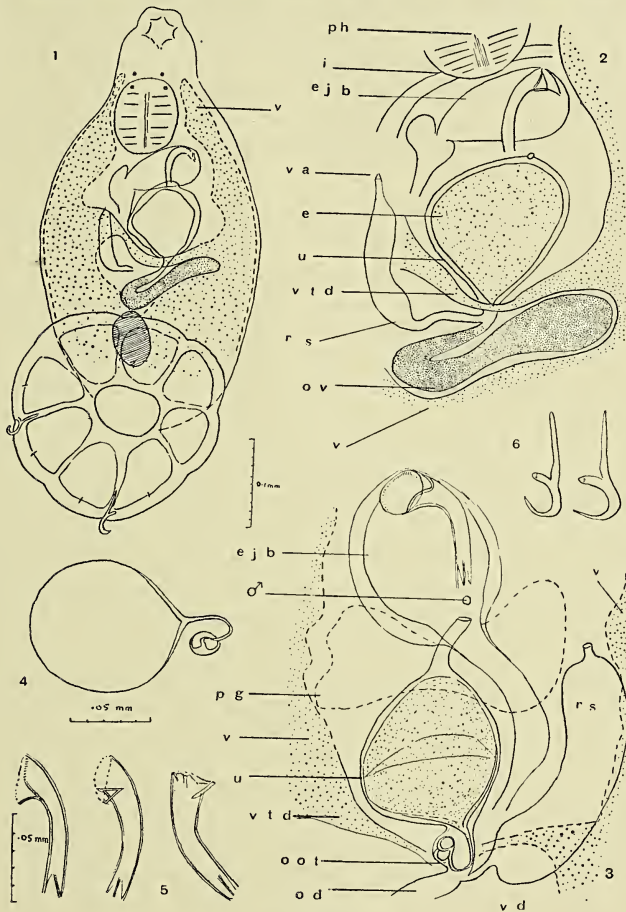
In 1922 a minute heterocotylean trematode from the gills of the common stringray of Sydney Harbour, *Urolophus testaceus* Mull. and Henle, was described briefly by Johnston and Tiegs as *Monocotyle robusta*. The accompanying text-figure indicates the general arrangements of the organs in dorsal view, though the relation of the cotylophore, as shown in it, suggests a ventral view.

As additional material has become available, though in a poor state of preservation and all of it somewhat distorted, a re-examination was decided upon. The Trustees of the Australian Museum, Sydney, kindly forwarded the type slide for re-study. The type is about 0.6 mm. long (including the cotylophore) by 0.24 mm. in maximum breadth, the widest portion being in the middle and posterior regions of the body, which narrows rapidly to join the sucker. The anterior end is broadly rounded. The mouth is surrounded by rather thin lip-like folds and is directed anteroventrally. In front of it, in some specimens, are to be seen low rounded head-lobes associated, no doubt, with cephalic organs as in other Gyrodactyloids. Dorsally are four eyes, the posterior pair slightly larger and more widely separated than the anterior pair. These organs are situated in the region just in front of the pharynx.

The cotylophore is about as wide as the broadest part of the body and its ventral surface is marked out into eight marginal loculi and a smaller, more or less rounded, central sucker, the last-named being the weakest in development. There is a delicate marginal fringe. The two major hooks lie one in each outer radius of the posterior loculi. Each hook has a long narrow straight rod-like root and a much shorter, thicker and slightly curved one, near whose free end is a ring-like thickening, probably for the insertion of muscle fibres. The longer dorsal root is rather wider near its junction with the other root and possesses a slight thickening in its inner (ventral) aspect. The free portion of the hook is strongly curved and terminates in a very sharp point. The length of each hook, excluding the curve, is about 0.062 mm., but if the curve be followed, then the length from the tip of the dorsal root to the free end of the hook is about 0.093 mm. The dorsal root measures 0.04 and the ventral 0.017 mm. long. The curves of the free portion are continuous with those of the ventral root. There is also a minute curved hooklet about  $7\mu$  long situated marginally in each interradius.

The wide ill-defined mouth narrows into a tubular portion succeeded by the comparatively large, transversely-marked, elliptical pharynx, about 0.08 mm. long. The latter is succeeded by the simple wide intestinal crura which are largely obscured by the vitelline glands.

There is a single, nearly median, testis lying behind the ovary and covered by the yolk glands. Its duct passes forwards on the right side alongside the vagina and receptaculum. It becomes swollen to form a vesicula, or more correctly, ejaculatory bulb, lying immediately behind the pharynx. The penis is a simple, slightly curved tube, 0.08 to 0.09 mm. long and 0.013 to 0.015 mm. in width. Its inner (and normally more or less anterior) end is slightly widened to form a kind of funnel, the walls being further strengthened by linear thickenings of the chitin, so that a V-shaped structure may appear when the organ is viewed from certain directions. The free end lies adjacent to the male pore and also has a marked longitudinal thickening near its tip. The prostate glands occupy a considerable region just above, and laterally from, the male pore. The glands



Text-figs. 1-6.

(1) *Monocotyloides robusta*—ventral; (2) reproductive system of type; (3) part of reproductive system, dorsal view; (4) egg; (5) penis; (6) major hooks.

Nos. 3 and 4 drawn to same scale; Nos. 5 and 6 to same scale.

Reference to lettering: e, egg; e j b, ejaculatory bulb; i, intestine; o d, oviduct; o o t, ootyp; o v, ovary; p h, pharynx; p g, prostate glands (outline of occupied area dotted); r s, receptaculum seminis; u, uterus; v, vitellarium; v a, vaginal aperture; v d, vas deferens; v t d, vitelline duct.

extend laterally and may reach the vitellaria. They overlie the anterior part of the uterus. Their ducts enter the posterior end of the vesicula, whose walls may become considerably thickened.

The ovary lies transversely just in front of the testes and is sharply bent in itself. Its loop reaches the intestine, but the density of the yolk glands would not allow one to determine whether the organ crossed above and below the intestine, as has been described by Goto for *Monocotyle ijimae*. The ootyp is very short and the shell glands appear to be restricted to a very small adjacent area. The uterus, when devoid of an egg, is a narrow, nearly median, duct terminating at the uterine pore beside the male aperture. One or both of these apertures were found to be displaced from the mid-line in some specimens, but this may perhaps be due to the distortion of the parasites and to their imperfect state of preservation. The uterine walls, especially near the ootyp, are considerably thickened. The egg is more or less circular, 0.09 to 0.10 mm. in diameter, but usually collapses and becomes distorted during the process of clearing and mounting. Posteriorly it has a small knob to which is attached a short filament terminating in a swollen portion supported by a bifurcate thickening of the chitinous covering.

The yolk glands are very conspicuous on account of their size and coloration. They form a rather compact mass, very narrow anteriorly, but very wide posteriorly where those of opposite sides seem to fuse, this mass extending from the level of the anterior part of the pharynx to the posterior end of the body. They obscure the crura and testes, but do not cover the ovary. The narrow transverse yolk duct lies between the ovary and uterus and ventrally to the ootyp.

The vaginal aperture lies on the right of the mid-line, more or less on the same level as the male pore. It soon widens into an elongate, well-chitinized receptaculum seminis which, when full of sperms, occupies the region between the corresponding intestinal crus and the uterus and may partly underlie the former. In one specimen this organ was 0.16 mm. long. It narrows into a vaginal canal which travels inwardly above and just behind the transverse yolk duct to join the oviduct as the latter receives the very short common vitelline duct.

The systematic position assigned to the species does not seem quite satisfactory. The type of *Monocotyle*, *M. myliobalis* Taschb., 1878 (from *Myliobatis aquila* from Naples), has not been properly described, the original account being very short and incomplete. Parona and Perugia's figure of a specimen from Trieste (1890) is probably incorrect in many particulars. The generic diagnosis given by Taschenberg and by Braun (1890) would include our form except in regard to the position of the female ducts. Goto gave an excellent account of a new species, *M. ijimae*, from a Japanese ray, *Trygon pastinaca*, and formulated an amended and more detailed diagnosis of the genus. The Australian species differs in its body proportions, form of penis, receptaculum, position of female organs, presence (apparently) of only one testis, and of a definite central loculus in the cotylophore. The two latter features seem to be of generic value and are possessed also by two species described by MacCallum (1916) from *Trygon* (or *Dasybatis*) *pastinaca* from the United States of America, viz., *M. dasybatis* and *M. d. minimus* (= *M. minima* Johnston and Tiegs, 1922). These three forms may be grouped together under a new genus, *Monocotyloides*, which may be diagnosed thus: Monocotylineae, near *Monocotyle*, but differing in possessing a single testis and a cotylophore with a central loculus in addition to the eight marginals; hooks as in *Monocotyle*. Type

*M. robusta* (Johnston and Tiegs, 1922). Other species: *M. dasybatis* (MacCallum, 1916); *M. minima* (Johnston and Tiegs, 1922).

MacCallum (1916) also described another species of *Monocotyle*, *M. selachii*, from a hammer-head shark, *Sphyrna zygaena*, and from *Carcharias obscurus*, but its cotylophore and major hooks are quite distinct from those of the Mediterranean, Australian and Japanese species. It seems to belong to a new genus, near *Merizocotyle*. The name *Paramonocotyle* is suggested for it, and the following diagnosis is based on MacCallum's figure and account: Monocotylidae; cotylophore devoid of radial septa, but with ventral surface subdivided into numerous rounded loculi; two major hooks and numerous small marginal hooklets on disc; four groups of cephalic glands; mouth and digestive system as in *Monocotyle*; single testis (apparently); vagina apparently single and opening ventrally on the right of the mid-line; receptaculum seminis (?); other genital characters as in *Monocotyloides*. Type *P. selachii* (MacCallum, 1916). If it were shown that the vagina was double, then the genus would belong to the Merizocotylineae and would differ from *Merizocotyle* in very few features. Johnston and Tiegs (1922) placed the subfamily in the Gyrodactylidae, but mentioned (p. 115) that it formed an intermediate link between the latter family and the Monocotylidae. When Cerfontaine (1898) erected the genus *Merizocotyle*, he placed it in the Monocotylidae. Fuhrmann (1928) considers that it belongs to the Monocotylineae.

#### Summary.

An amended description of *Monocotyle robusta* Johnston and Tiegs is given. The parasite, together with two other species, *M. dasybatis* and *M. minima*, is assigned to a new genus *Monocotyloides*.

*Monocotyle selachii* MacCallum is placed in a new Merizocotyline genus, *Paramonocotyle*.

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